Single Replacement Reactions

metal

A + BC → B + AC if A is a metal

Or

A + BC → C + BA if C is a non-metal

nonmetal

Mar 29-9:33 PM

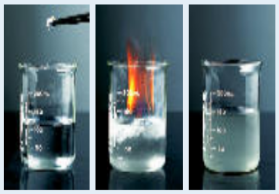
3 Single-Replacement Reaction

General Equation: $T + RS \longrightarrow TS + R$

Reactants: An element and a compound
In a single-replacement reaction, an element replaces another element from a compound in aqueous solution. For a single-replacement reaction to occur, the element that is displaced must be less active than the element that is doing the displacing.

Probable Products: A different element and a new compound

Example: Potassium in water



$2K(s) + 2H_2O(l) \longrightarrow 2KOH(aq) + H_2(g)$

ex: $K(s) + HOH(l) \rightarrow KOH(s) + H_2(g)$

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Double Replacement Reactions

AB + CD → CB + AD

metal

Mar 29-9:32 PM

4 Double-Replacement Reaction

General Equation: $R^+S^- + T^+U^- \longrightarrow R^+U^- + T^+S^-$

Reactants: Two ionic compounds
In a double-replacement reaction, two ionic compounds react by exchanging cations to form two different compounds.

Probable Products: Two new compounds
Double-replacement reactions are driven by the formation of a precipitate, a gaseous product, or water.

Example: Reaction of aqueous solutions of barium chloride and potassium carbonate

$K_2CO_3(aq) + BaCl_2(aq) \longrightarrow 2KCl(aq) + BaCO_3(s)$

$K_2CO_3(aq) + BaCl_2(aq) \rightarrow 2KCl(aq) + BaCO_3(s)$

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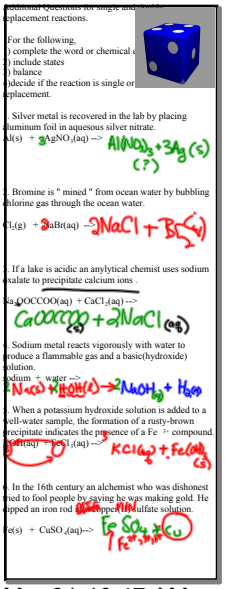

Additional Questions for single and double replacement reactions.

For the following,
) complete the word or chemical equation
) include states
) balance
) decide if the reaction is single or double replacement.

. Silver metal is recovered in the lab by placing aluminum foil in aqueous silver nitrate.
Al(s) + $AgNO_3$(aq) --> $Al(NO_3)_3 + 3Ag(s)$ (?)

. Bromine is " mined " from ocean water by bubbling chlorine gas through the ocean water.
$Cl_2(g)$ + NaBr(aq) --> $2NaCl + Br_2$

. If a lake is acidic an anylytical chemist uses sodium oxalate to precipitate calcium ions .
$Na_2OCCOO(aq) + CaCl_2(aq)$ -->
$CaOCCOO(s) + 2NaCl(aq)$

. Sodium metal reacts vigorously with water to produce a flammable gas and a basic(hydroxide) solution.
sodium + water -->
$2Na(s) + 2HOH(l) \rightarrow 2NaOH(aq) + H_2(g)$

. When a potassium hydroxide solution is added to a well-water sample, the formation of a rusty-brown precipitate indicates the presence of a Fe^{3+} compound.
KOH(aq) + $FeCl_3(aq)$ --> $3KCl(aq) + Fe(OH)_3(s)$

. In the 16th century an alchemist who was dishonest tried to fool people by saying he was making gold. He dipped an iron rod into copper(II) sulfate solution.
Fe(s) + $CuSO_4(aq)$--> $Fe + SO_4^{2-} + Cu^{2+}$

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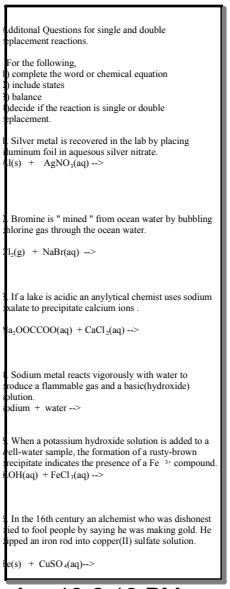

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KOH(aq) + $FeCl_3(aq)$ -->

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Apr 10-2:13 PM